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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,150	10/31/2003	Giampiero Antonelli	033275-413	1661
21839	7590	05/19/2005	EXAMINER	
BURNS DOANE SWECKER & MATHIS L L P			ELLINGTON, ALANDRA	
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2855

DATE MAILED: 05/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

**Office Action Summary**

Application No.

10/697,150

Applicant(s)

ANTONELLI ET AL.

Examiner

Alandra Ellington

Art Unit

2855

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on amendment filed 2/28/05.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1,3,4 and 6-20 is/are rejected.
- 7) ☒ Claim(s) 2 and 5 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413).  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **Non-Final Rejection**

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 4 and 6-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harding et al (6,701,615) (hereinafter Harding) in view of Sugiyama et al (4,739,261) (hereinafter Sugiyama).

a. With respect to Claim 1, Harding discloses a method comprising the steps of (a) the crack or gap is brazed (col. 6 lines 28-43, col. 10 lines 28-39) and (b) after the brazing operation any remaining braze defect is detected and quantified by means of a eddy current system 38 (col. 6 lines 44-67, col. 7 lines 1-29, col. 10 lines 40-48, col. 11 lines 36-67, col. 12 lines 1-10 (Fig. 1J)). Although, Harding does not specifically teach a multi-frequency scanning eddy current system, the use of a multi-frequency scanning eddy current in flaw detection is known. Sugiyama teaches a multi-frequency scanning eddy current system that detects and quantifies any flaws that are in an object (col. 4 lines 8-39 {Fig. 5}). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Harding with the teachings of Sugiyama to include a multi-frequency scanning eddy current system for the purpose of measuring

thickness, for detecting flaws and for measuring the size of flaws in structures (see Sugiyama, col. 1 lines 6-10, col. 4 lines 8-39).

b. With respect to Claim 4, Harding discloses the method step wherein the distance of the braze defect and the depth of the defect are determined (col. 5 lines 12-32, col. 7 lines 24-29).

c. With respect to Claim 6, Harding discloses the method step wherein dependent on the measured extent of the remaining braze defect or subsurface crack after brazing, a decision is made concerning the fulfillment of the serviceability of the quality requirements of the braze (col. 11 lines 13-67, col. 12 lines 1-10).

d. With respect to Claim 7, Harding discloses the method step wherein dependent on the extent of the remaining crack after brazing, estimated by the method, a decision is made concerning further usability of the article (col. 3 lines 50-62, col. 8 lines 35-51).

e. With respect to Claim 8, Harding discloses the method step wherein the surface of the crack or gap is cleaned from oxides before applying the method (col. 6 lines 5-10).

f. With respect to Claim 9, Harding discloses the method step wherein a Fluoride-Ion-cleaning-Method is used for cleaning the surface before applying the process (col. 6 lines 18-55).

- g. With respect to Claims 10 and 13, Sugiyama teaches a multi-frequency scanning eddy current system that is capable of detecting flaws of a variety of shapes, sizes and surfaces (col. 1 lines 6-10, col. 4 lines 8-39).
- h. With respect to Claim 11, Harding discloses a curved surface10 ({Fig. 1}).
- i. With respect to Claim 13, Harding discloses an external surface 10 of the article ({Fig. 1}).
- j. With respect to Claim 14, Harding discloses a method comprising brazing the crack (col. 6 lines 28-43, col. 10 lines 28-39); and detecting and quantifying, using a eddy current system, any cracks that remain beneath the brazed crack after the brazing (col. 6 lines 44-67, col. 7 lines 1-29, col. 10 lines 40-48, col. 1 1 lines 36-67, col. 12 lines 1-10 (Fig. 1J). Although, Harding does not specifically teach a multi-frequency scanning eddy current system, the use of a multi-frequency scanning eddy current in flaw detection is known. Sugiyama teaches a multi-frequency scanning eddy current system that detects and quantifies any flaws that are in an object (col. 4 lines 8-39 {Fig. 5}). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Harding with the teachings of Sugiyama to include a multi-frequency scanning eddy current system for the purpose of measuring thickness, for detecting flaws and for measuring the size of flaws in structures (see Sugiyama, col. 1 lines 6-10, col. 4 lines 8-39).

Art Unit: 2855

k. With respect to Claim 15, Harding discloses the method step wherein the surface of the crack is cleaned from oxides before applying the method (col. 6 lines 5-10).

l. With respect to Claim 16, Harding discloses the method step wherein the distance of the crack and the depth is determined (col. 5 lines 12-32, col. 7 lines 24-29).

m. With respect to Claims 17 and 20, Sugiyama teaches a multi-frequency scanning eddy current system that is capable of detecting flaws of a variety of shapes, sizes and surfaces (col. 1 lines 6-10, col. 4 lines 8-39).

n. With respect to Claim 18, Harding discloses a curved surface 10 ({Fig. 1}).

o. With respect to Claim 19, Harding discloses an external surface of the blade or vane ({Fig. 1}).

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harding et al (6,701,615) (hereinafter Harding) in view of Baladjanian et al (4,285,459) (hereinafter Baladjanian).

a. With respect to Claim 3, Harding et al discloses the claimed invention teaches except for the method step wherein the method is applied to blades or vanes of gas turbines made from Nickel base superalloy as the article.

Baladjanian et al the method step wherein the method is applied to blades or vanes 10 of gas turbines made from Nickel base superalloy as the article (col. 2 lines 49-59). It would have been obvious to one having ordinary skill in the art at

Art Unit: 2855

the time the invention was made to modify Harding et al with the teachings of Baladjanian et al to include the method step wherein the method is applied to blades or vanes of gas turbines made from Nickel base superalloy as the article for the purpose of achieving a high strength, low distortion, braze repaired article (see Baladjanian et al, col. 1 lines 6-19, col. 2 lines 5-7).

***Allowable Subject Matter***

4. Claims 2 and 5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. The following is a statement of reasons for the indication of allowable subject matter: The reasons for the indication of allowable subject matter are based on the inclusion of:

a. In Claim 2, the method step wherein after the brazing operation the brazed areas are inspected on a grid of points by an eddy current probe connected to a frequency scanning eddy current system, the signal obtained from the system at each inspected point is analyzed by means of an algorithm which fits the signal with calculated signal obtained from a simple model of the interaction between the probe and a multiple layer material, each layer of which is plane, homogeneous, and characterized by a value of electrical conductivity and positions of the interface with the adjacent layers, wherein the effect on the signal due to presence of a braze defect or subsurface crack is approximated by a

reduction of the electrical conductivity in a layer corresponding to the position of the braze defect or subsurface crack in the thickness of the material, from the algorithm estimates are obtained of the conductivity values and the position of the interfaces of each layers of the model, the presence of braze defect or subsurface crack is detected by comparing the estimated conductivity values obtained from the algorithm with reference values obtained in the same way on a defect-free component, the ligament and the depth of the braze defect or subsurface crack are determined from the estimated positions of the interfaces between the model layers.

b. In Claim 5, the method step wherein (i) local variations of the thickness of the article in the range of penetration of the eddy currents, (ii) or the presence or fins or ribs on the inner surface of the article, or (iii) the presence of an inner layer of air between two airfoils are suppressed as an interfering quantity in the measurement by including in the model one or more layers describing the said geometric features of the article.

### ***Response to Arguments***

6. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(5,237,271)



Art Unit: 2855

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alandra Ellington whose telephone number is (571) 272-2178. The examiner can normally be reached on Monday - Friday, 7:30am - 4:00pm.

9. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alandra Ellington  
Art Unit 2855



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**MAX NOORI**  
**PRIMARY EXAMINER**